

Claims

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1. In a low flow velocity gradient high performance liquid chromatographic apparatus, a diffusion promoting device provided just before a separation column and having a function for improving detection sensitivity.

2. A method for improving a detection sensitivity of a target component, which comprises providing the diffusion promoting device just before a separation column in a low flow velocity gradient high performance liquid chromatographic apparatus.

3. The diffusion promoting device according to Claim 1, which comprises a solvent inlet tube and a solvent outlet tube and satisfies the requirement 1) a part of either the solvent inlet tube or the solvent outlet tube has a larger inner diameter than the other portion; and 2) the solvent inlet tube and the solvent outlet tube are connected with a given angle with each other, or satisfies the both requirements 1) and 2).

4. The diffusion promoting device according to Claim 3, wherein the given angle formed between the solvent inlet tube and the solvent outlet tube is an acute angle, a rectangle or an obtuse angle.

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5. The diffusion promoting device according to Claim 1 or 3, wherein a frit is inserted in the solvent inlet tube and/or outlet tube.

6. The diffusion promoting device according to Claim 5, wherein the frit is a sintered filter, a ceramic, a metal mesh or a cellulose fiber.

7. The diffusion promoting device according to Claim 1, wherein the low flow velocity gradient high performance liquid chromatographic apparatus is a gradient micro high performance liquid chromatographic apparatus, a gradient semimicro high performance liquid chromatographic apparatus, or a gradient capillary high performance liquid chromatographic apparatus.

8. A low flow velocity high performance liquid chromatographic apparatus comprising the diffusion promoting device according to Claim 1 or 3 at just before the separation column.

9. A low flow velocity high performance liquid chromatographic apparatus in which the diffusion promoting device according to Claim 1 or 3 is connected between the component concentration column and the separation column.

10. A low flow velocity high performance liquid chromatographic apparatus in which a solvent pump (P1), an injector (I), a switching valve (V), a component concentration column (M), a switching valve (V), a solvent mixer (MC) and a switching valve (V) are connected in this order in one line; and a solvent pump (P2), a switching valve (V), the diffusion promoting device (DU) according to Claim 1 or 3, a separation column (C) and a detector (D)

are connected in another line, as shown in Fig. 8.

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11. A low flow velocity high performance liquid chromatographic apparatus in which a solvent pump (P1), a switching valve (V), a solvent mixer (MC) and a switching valve (V) are connected in this order in one line; a solvent pump (P2), a switching valve (V), the diffusion promoting device (DU) according to Claim 1 or 3, a separation column (C) and a detector (D) are connected in another line; and a switching valve (V), a component concentration column (M) and a switching valve (V) are connected in a different line, as shown in Fig. 9.

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12. A method for analyzing a trace amount of a component in a sample with improved detection sensitivity for use in the low flow velocity gradient high performance liquid chromatographic apparatus according to Claim 10, which comprises trapping the target component in the component concentration column (M) by means of a mobile phase discharged from the solvent pump (P1); discharging a different mobile phase from the solvent pump (P2) by turning the switching valve; and eluting the target component from the separation column (C) through diffusion of the target component using the diffusion promoting device (DU) according to Claim 1 or 3.

13. A method for analyzing a trace amount of a component in a sample with improved detection sensitivity for use in the low flow velocity gradient high performance

liquid chromatographic apparatus according to Claim 11, which comprises injecting the target component into the component concentration column (M) while filling a solvent in the solvent mixer (MC) by means of the solvent pump (P1); discharging a mobile phase from the pump (P2) by turning the switching valve; and eluting the target component from the separation column (C) through diffusion of the target component using the diffusion promoting device (DU) according to Claim 1 or 3.

14. A method for analyzing a trace amount of a target component for use in a low flow velocity gradient high performance liquid chromatography by concentration, diffusion and separation of the target component in a sample.